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Topic: ICES402

Extravehicular Activity: PLSS Systems

Title: Adsorption of Carbon Dioxide, Ammonia, Formaldehyde, and Water Vapor on Regenerable Carbon Sorbents

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Abstract:

Results are presented on the development of reversible sorbents for the combined carbon dioxide, moisture, and trace-contaminant (TC) removal for use in Extravehicular Activities (EVAs), and more specifically in the Primary Life Support System (PLSS). The currently available life support systems use separate units for carbon dioxide, trace contaminants, and moisture control, and the long-term objective is to replace the above three modules with a single one. Furthermore, the current TC-control technology involves the use of a packed bed of acid-impregnated granular charcoal, which is non-regenerable, and the carbon-based sorbent under development in this project can be regenerated by exposure to vacuum at room temperature. In this study, several carbon sorbents were fabricated and tested for simultaneous carbon dioxide, ammonia, formaldehyde, and water sorption. Multiple adsorption/vacuum-regeneration cycles were demonstrated at room temperature, and also the enhancement of formaldehyde sorption by the presence of ammonia in the gas mixture.

Key words:

Primary Life Support System (PLSS)

carbon dioxide

ammonia

formaldehyde

trace contaminants

water vapor

adsorption

vacuum regeneration